IMPACT OF STEP-UP EXERCISE PROGRAM OVER CONVENTIONAL EXERCISE PROGRAM IN IMPROVING GAIT IN STROKE PATIENTS – A COMPARITIVE STUDY

DISSERTATION

Submitted to

The Tamilnadu Dr. MGR Medical University

In partial fulfillment of the degree of

MASTER OF PHYSIOTHERAPY

(Advanced P.T. in Neurology Conditions)

Reg no : 271420162

Cherraan‟s College of Physiotherapy

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CERTIFICATE

The work embodied in the thesis Entitled **"IMPACT OF STEP-UP EXERCISE PROGRAM IN IMPROVING GAIT OVER CONVENTIONAL EXERCISE PROGRAM IN STROKE PATIENTS –A COMPARITIVE STUDY"** submitted to **The Tamilnadu Dr. MGR Medical University, Chennai** in partial fulfillment for the degree of **MASTER OF PHYSIOTHERAPY (ADVANCED P.T IN NEUROLOGY CONDITIONS)** was carried out by candidate bearing register number 271420162 at Cherraan's College of Physiotherapy, Coimbatore under my supervision. This is an original work done by her and has not been submitted in part or full for any other degree/ diploma at this or any other university/ institution. The dissertation is fit to be considered for award of the degree of Master of Physiotherapy.

Signature of guide

Prof. GOBINATH MPT.

Date:

Signature of Principal

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Date:

Internal Examiner

External Examiner

Project work evaluated on

DECLARATION

The work embodied in the thesis entitled **— IMPACT OF STEP-UP EXERCISES IN IMPROVING GAIT OVER CONVENTIONAL EXERCISE PROGRAM IN STROKE PATIENTS – COMPARITIVE STUDY** submitted to **The Tamilnadu Dr. MGR Medical University, Chennai**, in partial fulfillment for the degree of **Master of Physiotherapy(Advanced PT in Neurology)**, was the original work carried out by me and has not been submitted in part or full for any other degree/ diploma at this or any other university/ institute. All the ideas and references have been duly acknowledged.

Signature of the guide

Prof Mr.Gobinath MPT.

Signature of the student

Register number 271420162

Date:

ABSTRACT

OBJECTIVE

To compare the **IMPACT OF STEP-UP EXERCISE PROGRAM OVER CONVENTIONAL EXERCISE PROGRAM IN IMPROVING GAIT IN STROKE PATIENTS – A COMPARITIVE STUDY .**

PARTICIPANTS

Experimental: 15 subjects with stroke receiving step-up exercise program.

Control : 15 subjects with stroke receiving conventional exercise program.

METHODS

Experimental : forward step-up ,backward step-up and lateral step-up.

Control : Weight bearing, single leg stance, Balance training.

RESULTS

The results showed that **experimental** subjects have significant improvement in outcome measures than **control** subjects.

CONCLUSION

From the results of the study it can be concluded that, the step-up exercise is more effective than the conventional exercise in stroke patients.

TABLE OF CONTENT

INTRODUCTION

INTRODUCTION

Cerebro-Vascular Accident is the commonest cause of neurological disability and post-stroke individuals are the largest consumer of rehabilitation services. After a stroke, a hemiplegic stroke patient experiences symptoms such as weakened muscle strength, stiffness, pain, language disability, and circulation problems as well as functional problem with walking, walking up the stairs, standing up, turning around, and maintaining balance. Walking ability is a key indicator of a hemiplegic patient's advanced motor functions and his or her recovery. Enhancing independent walking ability is among the primary goals of treatment. Recovery of walking ability in the rehabilitation program is important because walking is a complex form of exercise that requires a high level of harmony among coordination, balance, kinesthetic sense, proprioception, and integrated working of joints and muscles. Walking is also among the important indicators of independent functional. Recovering and improving walking ability is a key goal and plays an important role in rehabilitation of stroke patients so that they can eventually return to the workforce and society. Individual with stroke continued to have deficits in symmetrical stance and weight shifting abilities despite the improvements in motor selectivity of the paretic limb and in balance and walking skills.

It has been contended that weight asymmetry and impaired balance function may be a consequence of a learned disuse of the paretic leg.

Gait speed, asymmetrical gait patterns are commonly observed. Gait asymmetries are often characterized by decreased duration of single leg stance on the impaired limb, differences in step length.

Step-up exercise is a means of weight bearing exercises to increase neuromuscular coordination of lower limb . Raising the foot on a step appears to be an appropriate strategy for weight shift training of stroke patients. Since weight shifting to both the paretic and non-paretic limb of stroke patients is impaired, treatment strategies should include training in weight shifting to both lower extremities.

Step up exercises are the activities which have been included in previous studies along with number of other task oriented exercises to improve the performance of walking in post stroke hemiparetic patients.

To improve the gait parameters , step up exercise was an appropriate one. It was done by placing the foot on a high step This study was intended to carry out selective task of step up exercises for stroke patients and to clinically compare the measures of outcome of gait parameters with the control gait training.

STATEMENT OF THE STUDY

A study to compare the Impact of task specific step-up exercise program over conventional exercise program on gait parameters in stroke patients.

NEED OF STUDY

Following a stroke attack a person with hemiparesis may be unable or reluctant to bear much weight through the paretic limb when significant paresis exists. Later on continued weight-bearing, asymmetry may continue and foster a further disuse despite the probability that improved motor function in the lower limb has occurred.

It is expected that task specific step-up exercise program may improve the gait parameter in subjects with Stroke.

OBJECTIVES OF THE STUDY

1) To compare the impact of task specific step up exercise program over conventional exercise program on step length of stroke patients.
2) To compare the impact of task specific step up exercise program over conventional exercise program on natural velocity of stroke patients.
3) To compare the impact of task specific step up exercise program over conventional exercise program on cadence of stroke patients.

HYPOTHESES

HYPOTHESIS TO TEST OBJECTIVE 1

RESEARCH HYPOTHESIS

There is a statistically significant difference in the mean step length of experimental group and control group.

NULL HYPOTHESIS

There is no statistically significant difference in the mean step length experimental group and control group.

HYPOTHESIS TO TEST OBJECTIVE 2

RESEARCH HYPOTHESIS

There is a statistically significant difference in the mean natural velocity of experimental group and control group.

NULL HYPOTHESIS

There is no statistically significant difference in the mean velocity of experimental group and control group.

HYPOTHESIS TO TEST OBJECTIVE 3

RESEARCH HYPOTHESIS

There is a statistically significant difference in the mean cadence of experimental and control group.

NULL HYPOTHESIS

There is no statistically significant difference in the mean cadence of experimental and control group.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

1. **Alexanders (2000)**Initially, following stroke a person with hemiparesis may be unable or reluctant to bear much weight through the paretic limb with significant paresis exists. Later continued weight bearing asymmetry may continue and foster a further disuse despite the probability that improved motor function in the lower limb occurred.

2. **Maynard V, Bakheit AM, Shaw S.:** Comparison of the impact of a single session of isokinetic or isotonic muscle stretch on gait in patients with spastic hemiparesis. Clin Rehabil, 2005.

3. **Hiroshize (2006)**Lateral step up exercise were found to improve the loading response by influencing the shifting of COG through the enforced recruitment of gluteus medius activity of the supporting leg and adductor longus of the stepping leg.

4. **Yukari (2006)**Stated that 12 week home based bench step exercise program on aerobic capacity, lower extremity power and static balance in elderly subjects were seen and it was concluded that there was a significant improvement of all three.

6. **Brucer, Vicki et al (2005)**Step up exercise program was found to be beneficial in accomplishing the task of challenging the lateral stability and maximum recruit of muscle fibers.

7. **Cheng (2005)** In addition to decreased gait speed, asymmetrical gait patterns are commonly observed. Gait asymmetry are often characterized by decreased duration of single leg stance on the impaired limb, difference in step length primarily decreased step length of the unimpaired limb versus the impaired limb.

8. **KC, Kim HA.:** The effects of gait ability in the stroke patients after stair gait exercise .

9. **Park YH, Kim YM, Lee BH.:** An ankle proprioceptive control program improves balance, gait ability of chronic stroke patients.

10. **Hyuk Cheol (2001)**Step up intervention additionally reinforced balance, strength and loading of the affected as well as unaffected limbs.

11. **Aruin (2000)**Compelled weight bearing of affected lower extremity is as effective strategy to improve the balance and locomotion.

12. **Laufer et al (2000)**Weight shifting to both the paretic and non paretic limb of stroke patient in impaired treatment strategies should include training on both lower extremities.

13. **Yang YR et al (2005)**Examined the effectiveness of adducted backward walking on gait cycle and symmetry in stroke patients and observed significant improvement in selected gait parameters.

14. **Wade DT (1987)**Step up exercise improved significantly in step length,stride length, therefore and increasing the cadence.

15. **Larkin** found that lateral step up exercise program improve the loading response by influencing the shifting of COG .

16. **Richard W Bohannon and Patricia** supported that the weight bearing and loading exercise to the affected also improves the sound limb.

MATERIAL AND METHODOLOGY

DESIGN AND METHODOLOGY

STUDY DESIGN

Experimental Study Design

POPULATION

All the well oriented and well co-operative Stroke subjects who fulfil the inclusion criteria were included in this study.

SAMPLE SIZE

30 subjects from the population were selected by Convenient sample technique.

INCLUSION CRITERIA

- Both male and female Stroke Subjects.
- Age between 45 to 65 years.
- Able to walk 10 meters independently
- Subjects with above Stage 3 of Brunnstrom's stages in affected lower limb.
- Subjects with ability to step up 6" high step stool in forward, backward and lateral directions.

EXCLUSION CRITERIA

- Subjects with Cognitive or perceptual disorders.
- Subjects with sensory impairments involving lower limbs.
- Subjects with severe orthopedic and cardio respiratory disorder.
- Subjects with Auditory or Visual impairment.

VARIABLES

INDEPENDENT VARIABLE

- Specific step up exercise program Conventional exercise program.

DEPENDENT VARIABLE

- Step length
- Natural Velocity
- Cadence.

DURATION OF THE STUDY

- 4 Months

METHODOLOGY AND PROCEDURE

EXPERIMENTAL GROUP

SPECIFIC STEP UP EXERCISE PROGRAM

Before starting the exercise program ,the dependent variables are assessed through a pre test and after completion of program again they are assessed through a post test.

SPECIFIC STEP UP EXERCISES:

The base line data was measured using the ink foot-print record method before commencement of the therapy, by measuring the gait parameters on a 10 meter walkway with a plain sheet of paper on its surface. Patients were instructed to step on an inkpad and were asked to walk on the paper roll. The footprints from the sole of the feet were produced on the paper as the patients walked from one end of the walkway to the other.

STEP UP EXERCISE PROTOCOL

Included the three main activities:

1. Forward Step up

2. Lateral step up

3. Backward step up

The exercise sessions were commenced in therapist's supervision and manual guidance. Each of above activity of step up exercise was repeated for 2 phases of exercises with a set of 10 repetitions in each phase. The rest period of 1 minute was given after the conclusion of first phase and the rest period of 5 min were given after the conclusion of the set before progressing to the next direction of step up activity. Exercises were given for duration of 4 weeks, 3 times a week. These Step-up exercises were practiced by using a step stool of constant step height of 15 cm i.e. 6" (length18" and breadth 13") with the variable step length i.e. the distance between the feet and step stool. Progression of the step length was given weekly by 2", ranging between the 4"-10" within these 4 wks of training. The intervention began with the patient's toes 4" from the step for forward direction; v^{th} toe from the step for lateral direction and heels from the step for backward direction step up activity. It was observed that patients were comfortable with this weekly step length progression irrespective of duration of onset of stroke and spasticity grade.

In the first phase of the exercise, the patients were initially instructed to lead with the paretic lower extremity followed by second phase in which patient will be instructed to lead with non-paretic lower extremity.

The order of the lead side was changed in the first and second phases of exercise after the 2 weeks of therapy program.

Prior to stepping, the patients were given the following specific instructions:

- Stand with weight evenly distributed;
- Step up at a comfortable speed;
- Look at the step if necessary but don't bend at the waist to do so;
- Don't push on your thighs for leverage; and
- Return to evenly distributed weight bearing once upon the step.

The step command prior to each repetition was 'ready, step on affected' or 'ready step on unaffected'. Upon completion of each step on, the patients were given a 'step down' command and instructed to return to the starting position (4"-10" range) from the step, depending which has been the starting distance between the toes and step stool. After completion of four weeks of therapy the patients were re-evaluated using the ink foot print method for any differences and the results were computed.

After the intervention the post score of all the gait parameters were taken.

CONTROL GROUP

CONVENTIONAL EXERCISE PROGRAM

Before giving the exercises Independent Variable the pretest score of Gait Parameters were taken.

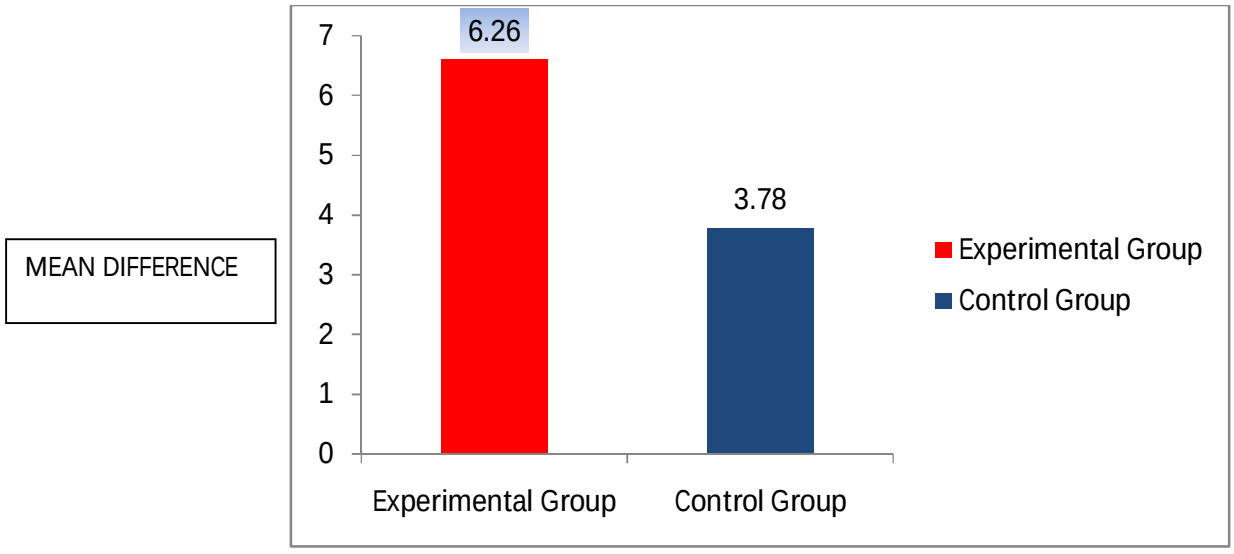
The subjects were informed to go for weight bearing on both legs, transmission of weight between both legs, single leg stance, standing both legs with the eyes closed. Each exercise was done with 3 times of repetition in the presence of a physiotherapist.

After the intervention the post score of all the gait parameters were taken.

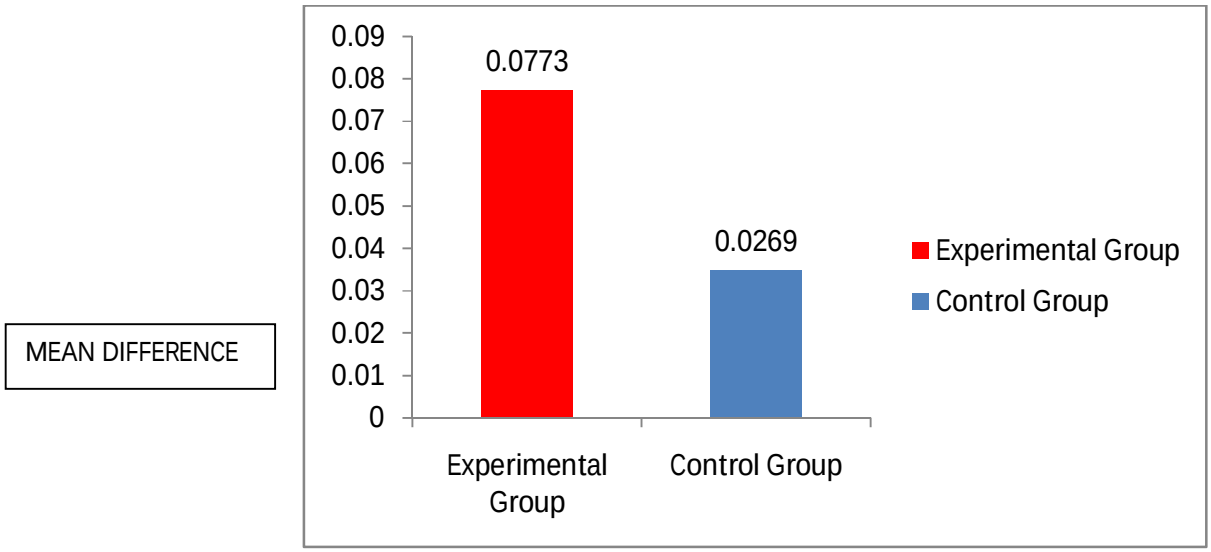
OUTCOME MEASURES OF EXPERIMENTAL , CONTROL GROUP

	EXPERIMENTAL GROUP			CONTROL GROUP		
	STEP LENGTH	NATURAL VELOCITY	CADENCE	STEP LENGTH	NATURAL VELOCITY	CADENCE
Mean Difference	6.26	0.0773	8.47	3.78	0.035	4.5
S.D.	2.19	0.0269	2.26	1.35	0.0083	0.99

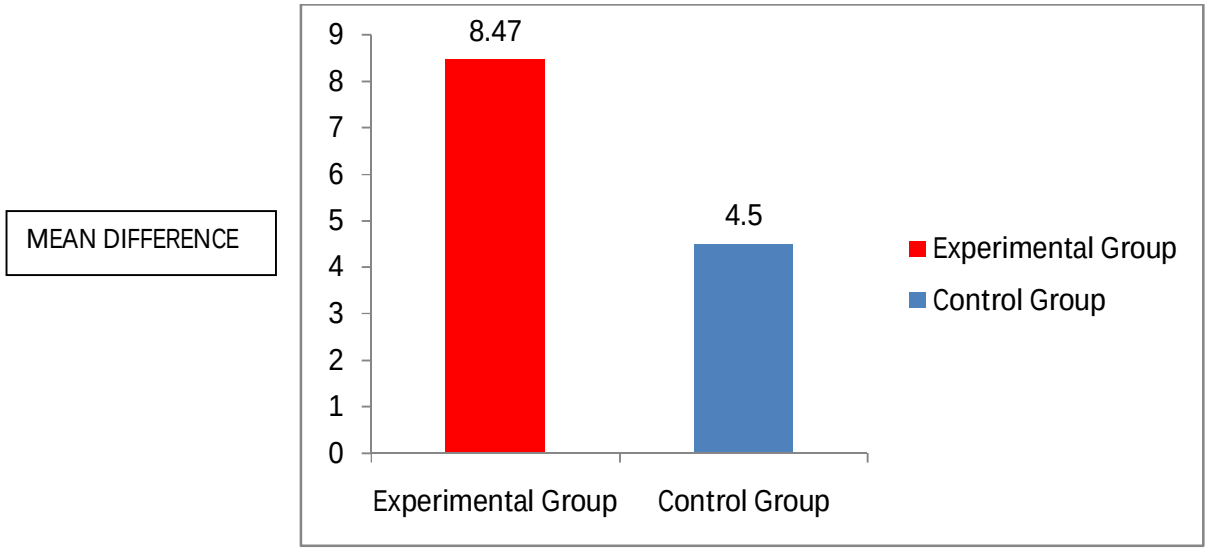
GRAPHICAL REPRESENTATION



STEP LENGTH



NATURAL VELOCITY



CADENCE

DATA PRESENTATION AND ANALYSIS

DATA PRESENTATION AND ANALYSIS

STATISTICAL DATA ANALYSIS TECHNIQUE

In both the groups, all data was expressed as mean difference ± SD and was statistically analyzed using 't' test and to determine the statistical difference and the level of significance by employing the statistical tools as given below

Mean $\bar{x} = \frac{\sum x}{n}$; Standard deviation SD = $\sqrt{\frac{\sum(x-x)^2}{n-1}}$

Where, $\bar{d}$ = mean difference; S_d = Standard deviation of difference

Independent t – test $t_{cal} = \left|\frac{x^1 - x^2}{SE}\right|$

SE= $s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$

Where, s = SE =

$$\sqrt{\frac{(n_1-1){s_1}^2+(n_2-1){s_2}^2}{n_1+n_2-2}}$$

n1, n2 = Size of the samples of two groups.

Independent t test results -

Result of Step length

t-calculated value	Table value
3.8	2.576

At P > 0.05 level of significance

Result of Natural velocity

t-calculated value	Table value
6.13	2.576

At P > 0.05 level of significance

Result of cadence

t-calculated value	Table value
6.4	2.576

At P > 0.05 level of significance

RESULTS AND DISCUSSION

RESULTS AND DISCUSSION

RESULTS

The pre and post scores of both groups shows significant difference.

Result 1:-

There is a statistically significant difference between the mean step length of experimental and control group.

Result 2:-

There is a statistically significant difference between the mean natural velocity of experimental and control group.

Result 3:-

There is a statistically significant difference between the mean cadence of experimental and control group.

DISCUSSIONS

The study was done to compare the impact of step up exercise program and conventional exercise program in stroke patients on gait parameters.

The participants in both the therapy groups improved in all gait parameters and it may be largely due to the learning and practice effects associated with the interventions in both the groups. However, the step up exercise intervention additionally reinforced balance, strength and loading of the affected as well as unaffected limb, which could explain the findings of the experimental group.

Kim reported that the step exercise results in significant improvements in ankle balance and that step exercise could be effective as an early-stage walking exercise for stroke patients. The step climbing exercise is part of the rehabilitation program to efficiently restore the walking ability of stroke patients.

Further, the improvement of control group may be explained by Ernst E A review in which Conventional physiotherapy for gait training is generally recognized as beneficial in patients with stroke.

Hyuk Cheol. Kwon et al studied the Characteristics of Lower Extremity Weight Bearing in Independently Ambulatory Hemiparetic Patients, it was proved that while the patients stand on the flat ground, basically the weight bearing removes to the sound lower extremity, the weight bearing other than that on the stool is loaded more, and the higher the stool i.e. 6" (15cm) stepped by a foot is, the more weight bearing of any lower extremity on the ground happens. It was further supported by the Richard W Bohannon and Patricia A Larkin and Laufer et al. Moreover, lateral step up exercises were found to improve the loading response by influencing the shifting of COG .

SUMMARY & CONCLUSION

SUMMARY & CONCLUSION

SUMMARY

The study was to compare the impact of step up exercise over conventional exercise in stroke patients.

Thirty subjects were taken and distributed in two groups of fifteen each. Before the treatment was commenced pre test values were taken in both the groups.(experimental and control).

Treatment was given for four weeks daily .Finally post tests were taken at the end of fourth week. The pre-test and post- test values were compared.

Then the results were analysed.

CONCLUSION:

From the results of the study it can be concluded that, the step up exercises show significant improvement in stroke patients than the conventional exercises.

- Both the groups show a satisfactory outcome in improving the gait.
- On comparison experimental group showed better outcome measures.
- Since the experimental group showed out a better outcome measures in steplength, natural velocity and the cadence, the improvement in gait and balance is much more than control group.

LIMITATIONS AND

RECOMMENDATIONS

LIMITATIONS OF STUDY

- The study duration is of shorter period.
- The study was limited to a particular age group.
- The study sample size is very small .
- Duration of treatment program was only 4 weeks, but the ideal time for the treatment program is much more.
- Follow up study is not done to find whether the beneficial effects obtained after training will be sustained or not.

RECOMMENDATION FOR FURTHER STUDY

- Sample size may be large.
- Study Duration may be increased to get accurate results.
- Home program and modifications can be taken into considerations.
- Study can be conducted in Bilateral Hemiplegia .
- Long term follow study is needed to evaluate the differences in the Condition of the patient from the current status.

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APPENDIX

APPENDIX I

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM in order to evaluate a study " **IMPACT OF STEP-UP EXERCISE PROGRAM IN IMPROVING GAIT OVER CONVENTIONAL EXERCISE PROGRAM IN STROKE PATIENTS- A COMPARATIVE STUDY".**

I kavitha here by invite you _____ to participate in the study and co-operate for measuring the gait parameters. Gait parameters: Step length , Natural velocity , cadence .

DECLARATION

I have been informed about the procedures and the purpose of the study. I have understood that I have the right to refuse my consent or withdraw it at any time during the study without adversely affecting my treatment. I am aware that being subjected to this study I will have to give my time for assessments and treatment and these assessments do not interfere with the benefits.

I, _____, the under signed, give my consent to be a participant of this study program/ clinical trial.

Signature of the investigator signature of participant

Date:

APPENDIX II

NEUROLOGICAL ASSESSMENT

Components of a Neurological Assessment:

1. Interview
2. Level of Consciousness
3. Pupillary Assessment
4. Cranial Nerve Testing
5. Vital signs
6. Motor Function
7. Sensory Function
8. Tone
9. Cerebral Function

1. INTERVIEW

The patient/family interview will allow the nurse to:

- gather data: both subjective and objective about the patient's previous/present health state
- provide information to patient/family
- clarify information
- make appropriate referrals
- develop a good working relationship with both the patient and the family
- initiate the development of a written plan of care which is patient specific

Interview to identify presence of:

- headache
- difficulty with speech
- inability to read or write
- alteration in memory
- altered consciousness
- confusion or change in thinking
- disorientation
- decrease in sensation, tingling or pain
- motor weakness or decreased strength
- decreased sense of smell or taste
- change in vision or diplopia
- difficulty with swallowing
- decreased hearing
- difficulty with swallowing
- altered gait or balance
- dizziness
- tremors, twitches or increased tone

2. LEVEL OF CONSCIOUSNESS

*****Consciousness is the most sensitive indicator of neurological change****

Consciousness can be defined as a state of general awareness of oneself and the environment. Consciousness is difficult to measure directly but it is estimated by observing how patients respond to certain stimuli. **Consciousness**	
Arousal	**Awareness**

Physiologic Basis for Consciousness

1. **Reticular Activating System (RAS)**

Loose network of neurons and fibres in the brainstem which receive input from spinothalamic (sensory) pathways and project to the entire cerebral cortex. **Arousal** is dependent on the adequate functioning of the RAS. Arousal is purely a function of the brain stem. It does not have anything to do with the thinking parts of the brain. The fact that your patient opens his/her eyes when you call their name is an indication that their RAS (brainstem) functioning is intact but it does not tell you if they are awake or aware.

2. **Cortex**

Modulates incoming information via connections to the RAS. Therefore, the cortex requires functioning of the RAS to function itself. **Awareness,** means that the cerebral cortex is working and that the patient can interact with and interpret his environment.
We evaluate awareness in many ways but tend to focus on four areas of cortical functioning: orientation, attention span, language, and memory.
Consciousness will be disturbed if a lesion of the RAS is present or if there is diffuse damage to the cortex (both hemispheres).
Some mechanisms by which consciousness is disturbed:

Diffuse cortical dysfunction:

decreased cerebral metabolism: hypoxia, hypoglycemia, acidosis/alkalosis, hyponatremia
drugs: alcohol, barbiturates, phenytoin, phenothiazines, benzodiazepines, methanol, ethylene glycol, paraldehyde
hypotension: decreased cerebral blood flow
structural lesions: infarctions, hemorrhages, tumours

Lesions of the RAS

Occasionally a lesion occurs directly in the upper brainstem (e.g. bleed, infarction, tumour) and causes coma by destruction of RAS. More often, a large destruction cortical lesion causes secondary damage to the RAS via: herniation or direct extension of the lesion into the midbrain or diencephalon.

Assessment of Level of Consciousness

A. Stimulate with progressively stronger stimuli:

i) normal voice

ii) shout

iii) light touch

iv) pain

> Observe patient's response (verbal or motor). If there is no response to voice or light touch, painful stimulus is needed to assess neurological status. Central pain should be used first. Sternal rub, supraorbital pressure, or pinching the fleshy portion of the upper arm near the axilla are methods for introducing central pain. Patience is needed to properly assess response. Watch for symmetry. Hand grasp is a reflex and is a poor test for motor strength.

If the patient does not respond to verbal stimulus but moves spontaneously in a purposeful manner (picks at linen, pulls at tubes), the patient is localizing. Painful stimulus is not required if spontaneous localization has been observed.

Localizing is purposeful and intentional movement intended to eliminate a noxious stimulus, whereas, withdrawal is a “smaller” movement used to “get away from” noxious stimulus. Localizing is sometimes defined as movement that crosses the midline.

Abnormal flexion differs from withdrawal in that the flexion is rigid and abnormal looking. Abnormal extension is a rigid movement with extension of the limbs.

B. If arousable, progress to assessment of awareness

The Glasgow Coma Scale (GCS) helps us to decrease the subjectivity of our responses. The GCS is not intended to identify focal findings; it is a rating score to grade the best possible central (brain) response. Remember to give each score the BEST possible rating. If the patient can only move one eyebrow to command, they are still given a “6” for motor score.

Score	Eye Opening	Speech	Motor Function
6		Obeys	
5	oriented	Localizes	
4	spontaneous	confused at times	Withdraws
3	to voice	inappropriate words	abnormal flexion
2	to pain	incomprehensible	abnormal extension
1	none	none	None
15 (best)			

Other common terms are used to describe assessment of LOC (e.g. alert, drowsy, confused, stuporous, comatose). It is important that the terms used are defined for the practitioners at the bedside and are used consistently. You want a change in terminology to represent a change in the patient, not the practitioner's interpretation of the terminology. At change of shift, perform a neuro exam with the oncoming nurse to ensure clear communication of the patient's previous status.

Definitions

Alert:

- awake, looks about
- responds in a meaningful manner to verbal instructions or gestures

Drowsy:

- oriented when awake but if left alone will sleep

Confused:

- disoriented to time, place, or person
- memory difficulty is common
- has difficulty with commands
- exhibits alteration in perception of stimuli, may be agitated

Stuporous:

- generally unresponsive except to vigorous stimulation
- may make attempt at verbalization to vigorous/repeated stimuli
- Opens eyes to deep pain

Comatose:

- unarousable and unresponsive
- some localization or movement may be acceptable within the comatose category depending on the coma definitions e.g. light coma to deep coma
- Does not open eyes to deep pain

5. **CRANIAL NERVE ASSESSMENT**

6. **VITAL SIGNS**

- **Respirations**
- **Pulse**
- **Blood Pressure :** Assess for hypertension, hypotension, and pulse pressure
- **Temperature**

6. MOTOR FUNCTION

When assessing motor function, from a neurological perspective, the assessment should focus on arm and leg movement. You should consider the following:

1. muscle size

2. muscle tone

3. muscle strength

4. involuntary movements

5. posture, gait

Symmetry is the most important consideration when identifying focal findings. Compare one side of the body to the other when performing your assessment.

Assessment of a Conscious Patient

Limb assessment of a conscious patient usually involves a grading of strength.

Grade Strength

5 Full ROM against gravity and resistance; normal muscle strength

4 Full ROM against gravity and a moderate amount of resistance; slight weakness

3 Full ROM against gravity only, moderate muscle weakness

2 Full range of motion when gravity is eliminated, severe weakness

1 A weak muscle contraction is palpated, but no movement is noted, very severe weakness

0 Complete paralysis

7. SENSORY FUNCTION

When assessing sensory function remember that there are three main pathways for sensation and they should be compared bilaterally:

1. pain and temperature sensation

2. position sense (proprioception)

3. light touch

Pain can be assessed using a sterile pin. Light touch can be assessed with a cotton wisp.

Sensory Tests:

A number of tests for lesions of the sensory cortex can be done.

Stereognosis: The ability to recognize an object by feel. Place a common object in the persons hand and ask them to identify the object.

Graphesthesis: "Draw" a number in the palm of the person's hand and ask them to identify the number.

Two-Point Discrimination: Simultaneously apply two pin pricks to the skin surface. Continually repeat the test while bringing the two pins closer together, until the individual can no longer identify two separate stimuli. The finger tips are the most sensitive location for recognizing two point differences while the upper arms, thighs and back are the least sensitive.

8. TONE

Upper motor neuron problems (brain and spinal cord) are associated with increased tone. Lower motor neuron problems are associated with decreased tone.

Reflex responses:

0 no response

1+ diminished, low normal

2+ average, normal

3+ brisker than normal

4+ very brisk, hyperactive

9. CEREBELLAR FUNCTION

The cerebellum is responsible for muscle coordination and balance on the same side. To test

cerebellar function use the following tests:

1. Finger to finger test: have the patient touch their index finger to your index finger (repeat several times).

2. Finger to nose test: perform with eyes open and then eyes closed.

3. Tandem walking: heel to toe on a straight line

4. Romberg test stand with feet together and arms at their sides. Have patient close his/her eyes and maintain this position for 10 seconds. If the patient begins to sway, have them open their eyes. If swaying continues, the test is “positive” or suggestive of cerebellum problems.

APPENDIX III- MASTER DATA

EXPERIMENTAL GROUP

	STEP LENGTH		NATURAL VELOCITY		CADENCE	
S.NO	PRE TEST	POST TEST	PRE TEST	POST TEST	PRE TEST	POST TEST
1	23	28	0.30	0.38	43	50
2	19.4	25	0.71	0.82	51	58
3	21	30	0.55	0.63	47	56
4	20.5	25.1	0.27	0.32	49	55
5	25.4	30.1	0.28	0.34	39	48
6	20	26.3	0.66	0.73	50	59
7	22	29.3	0.73	0.85	45	50
8	15	19	0.47	0.55	66	75
9	23.6	30	0.38	0.41	42	52
10	21.3	31	0.69	0.75	47	56
11	16.2	18.9	0.20	0.30	61	69
12	14	22	0.80	0.92	71	80
13	16.4	26	0.51	0.59	60	75
14	21.4	28.7	0.48	0.55	46	54
15	15	18.7	0.25	0.30	66	73

CONTROL GROUP

	STEP LENGTH		NATURAL VELOCITY		CADENCE	
S.NO	PRE TEST	POST TEST	PRE TEST	POST TEST	PRE TEST	POST TEST
1	12	15	0.20	0.24	73	77
2	23.4	30	0.16	0.20	42	45
3	18	21	0.32	0.36	50	55
4	16.7	20	0.68	0.72	60	64
5	19	25	0.26	0.28	49	54
6	12	16	0.25	0.28	72	75
7	19.6	24	0.40	0.45	51	56
8	23	26	0.63	0.67	41	47
9	19	21.1	0.70	0.74	45	49
10	21	24.2	0.47	0.50	47	52
11	20	25	0.21	0.23	60	65
12	16.2	18	0.45	0.48	63	69
13	15	19	0.49	0.53	36	39
14	24.2	28	0.31	0.34	42	47
15	17	20	0.35	0.39	40	45